AMERICAN ASSOCIATION OF COST ENGINEERS

Vol. 1, No. 2 March, 1959

BULLETIN

IN THIS ISSUE: Report of Board of Directors' Meeting

Aims and Objectives -- American Association of Cost Engineers

Cost Engineering Education

AMERICAN ASSOCIATION OF COST ENGINEERS

BULLETIN

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EDITOR
EDWARD D. SHANKEN

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AMERICAN ASSOCIATION OF COST ENGINEERS
University of New Hampshire
Durham, New Hampshire

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Notes from the Editor

Thank You.

Yes, I certainly want to thank everyone who offered their comments and constructive criticism regarding the first issue of the *Bulletin*. At the risk of repeating myself I want to encourage you to be a regular contributor to its pages. *Copy deadline for the next issue is April 25, 1959.*

When you write to the Executive Secretary or the Editor please note in your letter if you would like to have your comments considered for the *Letters to the Editor* column. The name of the writer will be printed unless the request is made that it be withheld.

A very successful Board of Directors meeting was recently held and is summarized in this issue. Under the leadership of President C. A. Miller, the Board considered a number of issues and acted on problems confronting our Association. The Board appreciated the opinions expressed by the membership in reference to cost codes, limitation of membership and other aspects of our organization.

While the program for the Annual Meeting is shaping up in good order Jim Caufield, chairman of the Technical Program is still interested in receiving informative papers that could be included in the program. Write to him at Chemetron Corporation, P. O. Box 174, Louisville 1, Kentucky.

We invite your cooperation in assisting us with the exacting task of compiling an accurate Directory. You should have received a Master File Card recently. Please complete this card and return it to the Executive Secretary immediately so that you will not be omitted.

I look forward to seeing you in Pittsburgh on June 24.

COVER:

A candid view of the Board of Directors in session in New York on January 29, 1959.

Left to right: B. J. Gaffney, C. A. Miller, O. T. Zimmerman, W. E. Hand, E. F. Brummerstedt, E. D. Shanken and C. R. Hirt.

In foreground, backs to camera, J. W. Hackney, E. K. Clark and C. H. Chilton. *(See Summary of Minutes of Meeting on page 28)*

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Letters to the Editor

1st Issue Comments

Dear Sir:

Congratulations on your first issue of the *Bulletin*. You have given yourself a man-size goal to continue this fine publication in its present form.

J. B.

Dear Sir:

Your first *Bulletin* of the AACE was received with enthusiasm.

A. W. S.

Dear Sir:

I have two comments regarding the first issue of the *Bulletin*. First, the cover is so atrocious that I am ashamed to place it face up on my desk, surely we can do better than this for a cover. Second, I think the balance of the *Bulletin* is excellent. Keep up the good reporting.

C. H. B.

Dear Sir:

My congratulations on your fine first issue of the *Bulletin*. It's a real good piece of work.

J. W. H.

Dear Sir:

Congratulations to everyone who made possible the first issue of the *Bulletin*. This publication is a real step forward in the development of our Association.

C. P. R.

Contractors' Estimating

Dear Sir:

After we returned from the Cleveland convention, there was some discussion in our office about the lack of papers by construction contractors who would seem to have the best access to actual cost data. Perhaps the best reason is as was put by one of our men: "Companies whose bread and butter depend on their skill at estimating costs are not likely to part readily with such information." This is probably so, and we can only hope that such companies will find some way to do it without hurting themselves.

However, there seems to be a tendency by some to think that the type of estimating done by contractors is the only kind ever done. In my work I'm sometimes called on to prepare a rough estimate with very little information except a preliminary flow sheet (for different process evaluations, etc.). In situations like this I must take short cuts that will give reasonable answers without developing the full details. If you ask a contractor for an estimate or a bid based on information like this, he wouldn't even talk to you.

I believe that this point could be cleared up by a close study of the work already done on "Estimate Types" by the Estimating Method Committee. The "contractor's bid" type of estimating clearly falls into the "Detailed Estimate" type.

I personally fear that AACE may be biting off too big a chunk too soon in its life to begin branching out now. I believe we still need the "unifying influence of a common industry interest." So much remains to be done in our beginning fields, we stand the chance of becoming lost at sea if we try to take in other fields now.

However, I must admit to a little selfishness on this point since our company's interests are primarily in the process industries field.

W. O. C.

General Mundy To Address Third Annual Meeting of AACE

Lieutenant General George W. Mundy, United States Air Force and Commandant of the Industrial College of the Armed Forces, will be the banquet speaker at the Third Annual Meeting of the AACE on June 24-26, 1959 at the Carnegie Institute of Technology in Pittsburgh, Pennsylvania.

Included in General Mundy's distinguished career was his assignment as Director, Supply and Services, at United States Air Force Headquarters, Washington, D. C. He was also Commander of the Strategic Air Command's Second Air Force at Barksdale Air Force Base, Louisiana, before being reassigned as Commandant of the Industrial College of the Armed Forces. The Industrial College is one of the nation's most senior joint service colleges, specializing in the study of the inter-relationship of national defense and all aspects of the world economy.

AACE INSIGNIA

A novel distinctive sterling silver tie-clasp and lapel button has been designed for members of the AACE. You will be proud to wear this personal jewelry which features the attractive AACE emblem.

A new supply has just arrived and is now available. The price is $2.30 for the lapel button and $3.80 for the tie-clasp, postage is included. Send your order and check to:

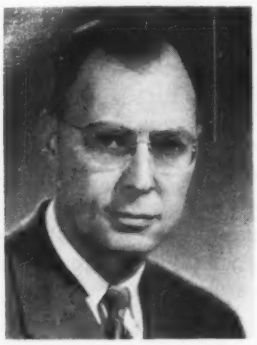
Executive Secretary

American Association of Cost Engineers
Durham, New Hampshire

Aims and Objectives -- American Association of Cost Engineers

Address presented before the Mid-Atlantic Regional Section's meeting of January 28, 1959.

By C. ARTHUR MILLER, *President of AACE*



I find myself in the embarrassing position of discussing today some of my thoughts on aims and objectives and being aware of the fact that the AACE is so dynamic that by this time on Friday my ideas may be out-of-date.

However, on further thought this is probably the way it ought to be for any association that doesn't want to stand still. We are feeling our way together. Let us hope that, as a result of our contacts with each other in the next couple of days, all of us can advance a little further in understanding and promoting our common goals.

In working out my thoughts for this talk, I have naturally been influenced by John Hackney's excellent article in our recent issue of the *Bulletin* — "A New Breed of Engineers".

I can think of no better methods for carrying out the objectives of the AACE than by:

- — becoming familiar with each other to breed a better cost engineer.
- — bringing cost engineers together to breed better cost engineering.
- — becoming familiar with our common objectives and projecting ourselves into their solution, to bring to fruition an idea that is good for ourselves, for industry and for our countries.

To pursue this a little farther, I would like to mention my own personal experience.

A few years ago I didn't know a single person in this room. During the past two years I have become familiar with many of you. Out of that familiarity I know that I have a better grasp of cost engineering now than I had before. And I like to think that you in turn have found the relationship of value.

I also feel that in both a tangible and an intangible way, the company I work for has made a gain.

And along these gains there is a deep conviction that we are doing constructive work. We are rising to fill a need which heretofore had not been filled. We are doing constructive work that will benefit our countries and the system under which we operate.

What then is involved in this "breeding operation"?

FIELD OF INTEREST

I believe the first step is to establish our field of interest.

To clarify a field of interest it is sometimes desirable to indicate the related fields in which you are not interested as well as those in which you are. To illustrate this I have drawn up Figure 1, which is my interpretation of our area of interest according to the present constitution.

Thus we have a broad picture of what we mean by "cost engineering in or related to the process industries".

REASON FOR FOUNDING

Why did the founding members find common ground in this field of interest? At the risk of being guilty of repetition, I will discuss this aspect briefly. In the case of engineering design, the language used is standardized so well, and taught in our institutions so well, that it is possible to make a set of blueprints in this country and send them across the ocean to some foreign country where a group of engineers who don't even speak English can translate them into reality. In the same way the chemist speaks a language which is universal the world over.

Strangely enough, the related field of cost engineering seemed to be more or less a neglected area.

I don't wish to imply that cost engineering practices and techniques need to have the same universality as engineering design or chemistry. For example, cost engineering may not be a major factor in a controlled economy, but it is very much an inherent part of any engineering venture in the economic system under which we operate. Not only is cost engineering essential in order to survive in our economy, cost engineering is essential for survival *of* our economy.

At the time of our founding, textbooks and magazine articles were available on cost engineering. It was not as if some new field of engineering had been discovered. But there was no positive program attempting to advance and improve the science for the common good. The founding members agreed that confusing and misunderstood terminology was causing delays and inefficiency in industry. It was recognized that a canvass of ten different companies would yield ten different cost codes, all being used for cost control purposes for the same reasons. Substantial data were published on various cost indexes but many persons involved in cost engineering could not find the answers they were looking for. Many engineers came out of college without a basic appreciation of cost engineering in industry. Although many common practices had developed, the detailed practices and techniques were substantially a function of individual company policy. There was no organized system for exchanging information and experience.

Out of this type of thinking the AACE was founded.

The founding members represented contractors, consulting engineers, processing companies, fabricators and educational institutions — all concerned with cost engineering in or related to the process industries. It was this area of cost engineering that they knew well and in which they knew the needs that existed. It was recognized that communications, efficiency and knowledge could be improved in their profession for

their mutual benefit and for the common good.

OBJECTS

And so we have our basic aims:

— To advance the science and art of cost engineering in or related to the process industries.*

— To provide forums and media for reporting, discussing and sharing knowledge in the field.

— To promote standardization where practical.

— To encourage instruction in cost engineering in standard engineering curricula.

— To co-operate with other organizations having common interests.

To advance the science and art of cost engineering is a broad expression and all embracing. It has been well chosen for our first objective. Stated another way it may be said that the objective of the AACE is to advance the systematic organization of cost engineering knowledge and then promote and encourage the development of skill in putting this knowledge to work.

EXECUTION

How then will we go about accomplishing these objectives?

The first action taken by the Board following the founding of the association was to organize an "annual meeting". I will leave it to you to assess the success of the two annual meetings already held. By these two meetings a great many people were brought together. Good papers were presented; good discussions followed; progress was reported. In every sense these meetings have afforded a medium for reporting, discussing and publishing information on cost engineering. These meetings have been arranged and conducted with a degree of competence and quality that matches other conventions by much older and more experienced professional organizations.

In fact, these meetings have been so successful that their continuance should be encouraged and they should be expanded. One annual meeting is insufficient for a widespread membership when many members are unable to attend because of distance. The benefits of personal contact cannot be overstressed.

This fact was recognized by the first Board in the creation of regional sections. Regional sections provide an outstanding opportunity to bring members together, to present papers and discuss common problems. They are a fertile field for finding capable people for committees and are a means of finding outstanding speakers and papers for presentation at the annual meetings.

Like other areas of engineering, cost engineering should begin in the universities. The extent to which cost engineering subjects are taught in the many engineering schools throughout our countries varies greatly. However, I know many engineers have had a formal training similar to my own. We took a subject called engineering economics. It was taught to us by our dean who was known to all the students as "Charlie Horse". The advice that he emphasized over and over again was very sound and has stayed in my mind to this day, "An engineer can do with one dollar what any fool can do with two". It was excellent advice but unfortunately there was not enough about how to achieve this feat.

I would like to mention the progress your association has made in encouraging cost engineering instruction in standard engineering curricula.

An education committee has been formed. It has established its objective as the development, presentation and implementation of methods and standards for teaching engineering economics and the concepts of cost engineering in our colleges and universities. A suggested list of subjects to be covered in an education program has been drawn up. This list has been sent to the Deans of all engineering schools in the United States and Canada as a suggested list of subjects to be included in courses on cost engineering.

At this stage I wish to discuss the objective: "to promote standardization of terminology in cost engineering and so far as practical develop standard methods". This aspect of our objectives is so important and far reaching that I believe it is the major factor that contributed to the founding of the Association.

In order to cover this aspect, I would like to go back to Figure 1 and expand this chart into greater detail. Figure 2 develops one aspect of the area of interest — profitability.

Some components such as the estimation of capital costs may be carried out by an estimating depart-

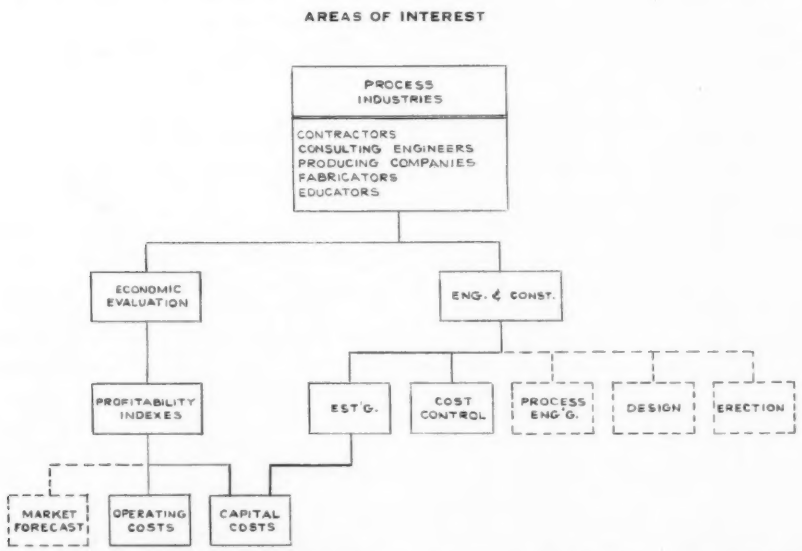


Figure 1. The solid lines indicate our fields of interest while the dotted lines indicate related fields in which we are not interested.

* The Board is proposing an amendment to the Constitution whereby it will recommend that the words "in or related to the process industries." be deleted.

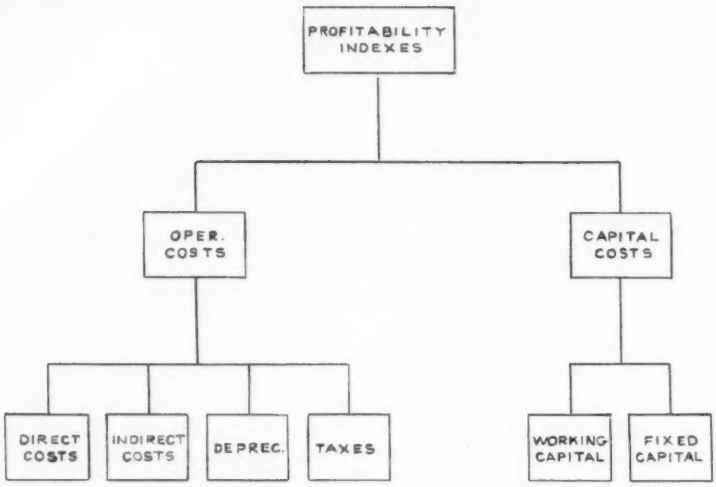


Figure 2. — Various components associated with profitability.

ment or by the economic evaluation group.

I believe some confusion exists about the meaning of operating costs in profitability studies. According to my interpretation we are not basically concerned with the cost accounting of manufacturing costs. This seems to be the area of the cost accountant. However, we are concerned with the complete concept of operating costs, how they are built up and how to estimate and assess them for profitability studies. This is the meaning I attach to operating costs in this chart.

As we consider the need in profitability work a great many things come to mind. For example:

Profitability indexes
- — the various kinds
- — what they mean
- — when they are useful
- — how to calculate them

Operating costs
- — A basic approach
- — Methods of developing
- — Treatment of taxes, depreciation, etc.

Terminology
- — Definitions of:
  - Profit
  - Incremental costs
  - Out-of-pocket costs
  - Full costs
  - Expense
  - Direct and indirect costs

Figure 4 is a graphical concept of a complete estimating and cost control system. If you let your imagination take over, it would be very easy to say that this graph depicts every phase of interest on the construction side of cost engineering.

Similar needs to those existing in the profitability field also exist here.

Terminology is confusing.

Estimating techniques vary from company to company.

Optimum use of cost data is not being made.

Cost control procedures vary greatly.

Cost codes are almost as numerous as companies.

Because there is lack of co-ordination in this work, communications suffer, misunderstandings and mistakes occur and the overall cost of construction work becomes costlier than it need be.

If these problems are common to hundreds of contractors and companies throughout the country it is not too much to say that the country itself is suffering as well as the companies.

This leads us to the objectives of the various technical committees. As you know, the work of the technical committees is so closely related that their activities need to be well co-ordinated. It was for this reason that they have been placed under the general guidance of one director.

The *Terminology Committee* was set up to investigate and recommend specific definitions for the various terms common to the field of cost engineering. Emphasis would be placed on those terms which appeared to have mixed meanings and caused confusion.

The Estimating Methods Committee was commissioned to develop standard estimating procedures and techniques as related to:

Type of data available

Accuracy and speed required

Need and purpose of the estimate.

This work is being co-ordinated so that the various procedures will embrace terminology, definitions and code of accounts as prescribed by the other committees.

The *Cost Records Committee* was

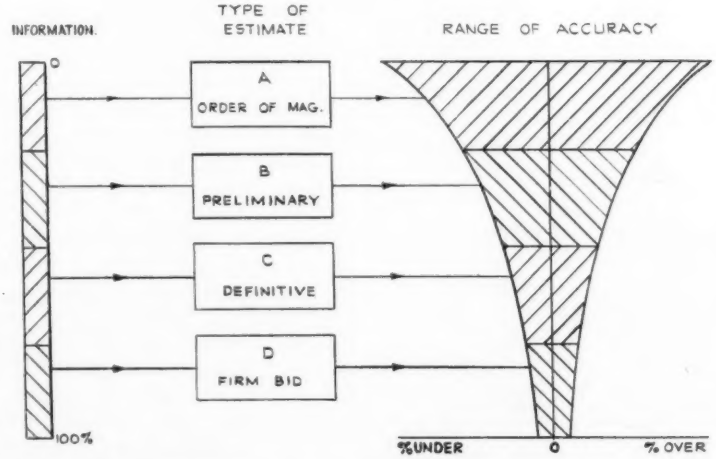


Figure 3. — Illustrates an estimating system and demonstrates our concern with information, type of estimates and range of accuracy.†

† See H. C. Bauman — Industrial & Engineering Chemistry, April, 1958.

set up to develop cost code systems which have sufficient scope, detail and flexibility to serve as standard guides for the many fields of cost engineering represented by the AACE membership. Such codes would provide:

- A basis for defining the scope of a project in standard form.
- A basis for standard control of costs.
- A basis for maintaining capital asset records.
- A basis for providing feedback information to estimators so that it can be readily incorporated into the estimating procedures as prescribed by the committee on estimating methods.

The Profitability Committee would investigate and assess the various methods in use for economic evaluation and recommend procedures for developing them. Initial emphasis would be placed on profitability indexes as distinct from manufacturing costs and capital investment.

The *Cost Index Committee* was set up to perform studies and research on the general subject of cost indexes with a view to developing a better understanding and application of indexes. It would evaluate existing indexes and study and make recommendations as to any action the AACE should take in this field.

I don't propose to discuss the progress of these committees as it has been reported elsewhere. (*AACE Bulletin*, Vol. I, No. I, Nov. '58.)

However, I would like to conclude my remarks with some thoughts about 1959 and the future.

FUTURE

First of all we must develop a greater understanding of our purpose and objectives. We must have a clear, concise picture of what we want, how we're going to get it, and where we are now.

The name "process industry" needs defining as well as industries "in or related to the process industries". In fact many persons have raised the question why our association is limiting its activities to the process and related industries. They claim our field of interest should be "cost engineering" without any qualifications. This matter is coming up for discussion at the Board meeting tomorrow.

ESTIMATING & COST CONTROL SYSTEM.

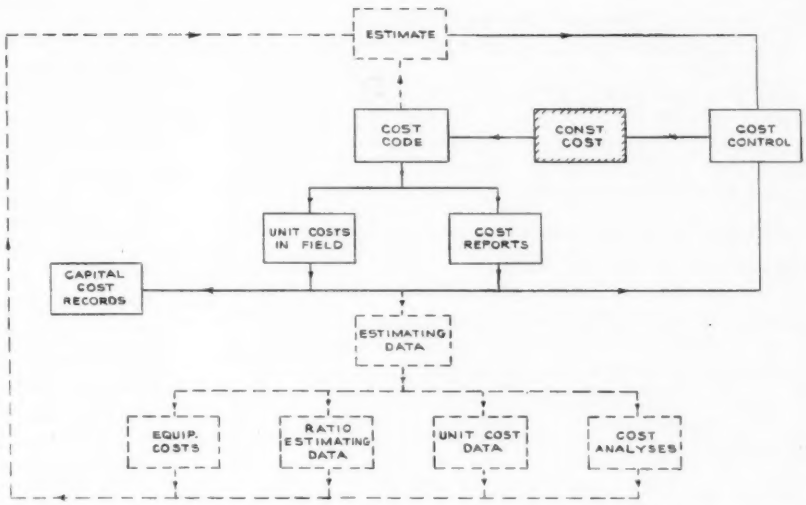


Figure 4 — The solid and dotted lines separates this into two general categories "cost estimating" and "cost control."

Once our objectives are well understood, we must make a basic, fundamental move towards them. This presents the problem of going slowly and thoroughly at the risk of discouraging a hungry membership, or alternately we could go faster and pump out information quickly for the membership at the risk of finding later that maybe it was only skin deep.

This problem applies to the regional sections as well as the central organization and close liaison is required between the two groups. Our association is young, enthusiastic, and dynamic. It is to be hoped that we will progress in the right direction with leadership at all levels of our association which will look at these problems objectively and with wisdom.

We need increased member participation — committee members who are willing to work at both central and regional levels. Again I must stress that benefits in any association go in two directions. If any man is guilty of saying "what am I getting out of the AACE?", let him first answer, "what am I putting into the AACE"?

Our technical program must be strengthened. There is increasing evidence that progress is very slow if members are widely scattered. Our present progress is not regarded as satisfactory and this is another subject that will receive considerable discussion during the next two days at the meeting of the national board of directors of the AACE.

Probably the most effective way to correct this is to have work assignments carried out by groups of persons who can meet regularly. At the same time, it stands to reason that we can't have little groups all over the country without some well organized plan. The work must be properly coordinated with a clear objective in sight.

The logical conclusion seems to be a central committee to plan, organize, assign and co-ordinate the work programs, and regional committees to be the work horses. Parallel committees are required in all the regions. Strong, capable men are required who can work closely with the central committees and "spark plug" the activities in the region.

If your talents and interests do not lie in technical work there are many other jobs that are important and essential if our association is to progress.

If someone were to ask what was the most important factor affecting the future of the AACE, I would say "communications".

There is room for all kinds of

(continued on page thirty)

Summary of Minutes of Board of Directors' Meetings

January 29 - 31, 1959

McGraw-Hill Building, New York City

Officers in attendance were: *President*, C. A. Miller; *Vice President*, B. J. Gaffney; *Secretary*, E. F. Brummerstedt; *Treasurer*, C. H. Chilton; *Directors*, E. K. Clark, W. E. Hand, J. W. Hackney, Dr. O. T. Zimmerman; and *Executive Secretary*, E. D. Shanken.

The following committee chairmen or members were also present part or full time:

Cost Records, C. R. Hirt; *Publications*, R. E. Fithian; *Membership*, J. S. Bleakie; *Admissions*, J. C. Agarwal; *Coordination*, Elsie Eaves; *Convention Program*, J. J. Caufield; *Convention Arrangements*, J. H. Black; *Past President*, N. G. Bach; *President of Pittsburgh Section*, A. W. Seekins; *and Cost Records Committee*, E. F. O'Connell.

January 29, 1959

1. President Miller called the meeting to order at 9:15 A.M.

2. Executive Secretary Shanken read minutes of the last board meeting of June 15, 1958, at Cleveland, Ohio.

3. Executive Secretary Shanken reported that the Association had grown to 600 paid-up members including fifteen from outside North America. Favorable publicity resulted from references to the AACE in *Management Digest* an overseas condensation of U. S. technical journals and in *N. Y. State Professional Engineers' Bulletin.*

4. The distribution of a bulletin by the "Industrial Education Institute" to the membership resulted in a general discussion as to policy regarding membership lists. J. W. Hackney moved that our present policy regarding use of the membership list be continued by making it available to organizations which will be issuing information of assistance to our membership, but that such mailings be without a cover letter by AACE or any other indications, expressed or implied, of sanction or endorsement by AACE. Motion was approved.

5. C Chilton moved that we require the payment of $10 with membership applications, which sum shall be credited towards payment of membership dues. Motion carried. In addition, J. W. Hackney moved that new members be charged a full year's dues for the calendar year in which their application is approved. Motion carried. Executive Secretary is instructed to amend the information folder accordingly before getting additional reprints. This will also eliminate rebates or fractional dues. No agreement could be reached on the desirability of combining national and regional dues, despite a good deal of discussion pro and con.

6. Vice-President Gaffney led a discussion on the annual meeting in June. Messrs. Caufield and Black presented preliminary programs, copies of which are on file with the Executive Secretary. The discussion involved methods of presentation of the "Workshop Seminars." This problem will be resolved by the committee after further study.

7. Director W. Clark suggested by letter that a climactic feature of the convention be considered such as the presentation of three competitive preliminary estimates of a basic plant (defined by flow sheets and plot plan) by three separate individuals or organizations:

a. Process or operating company.
b. Engineering and construction contractor.
c. Consulting engineer.

This was an attractive suggestion and worthy of consideration but doubts were expressed regarding its implementation.

8. A series of plant tours were being considered, including Shippingport Atomic Power Plant, Mellon Institute, Steel Mill, etc.

9. E. Clark brought up the subject of the 1960 annual meeting in Houston, Texas. He was directed to pick the most suitable period during June 10-30, 1960 i.e., that period involving the least conflict with other technical meetings. The Gulf Coast Regional Section had already started planning for the meeting and the possible use of local university campuses or a suitable hotel in Houston were being investigated.

C. H. Chilton emphasizes a point.
Left to right: C. H. Chilton, R. E. Fithian, E.K. Clark, J. J. Caufield, J. W. Hackney, J. S. Bleakie, J. H. Black, A. W. Seekins. In foreground, backs to camera, E. D. Shanken and E. F. Brummerstedt.

10. Vice President Gaffney led the discussion on his Planning Committee report submitted at last June's Cleveland meeting. It was regarded as an excellent report and offered a great deal of "food for thought" for the Board. Many of its recommendations were on the agenda and are discussed separately throughout the minutes. Further discussion brought out the recommendations that the speech given by President Miller at a luncheon meeting of the New York Regional Section yesterday (January 28) be published in the *Bulletin.*

11. Considerable discussion took place on the relationship between regional sections and the central Board. The director of member relations would be responsible for developing better communications by working through the Regional Sections Committee. All presidents of regional sections would automatically become

members of the committee. The discussion reflected various viewpoints as to the best means of making progress through committee work. The national committees are handicapped because of distance and the time lapse due to poor communications. It was hoped that gradually the regional sections would do the basic technical work through assignment by the national central committee, and that they would eventually volunteer for certain projects. This evolutionary development is also desirable from the standpoint of arousing more interest in and stimulating regional membership activities. The Planning Committee would also investigate this problem of better communications with the regions in its studies this year.

12. Dr. Zimmerman presented a new draft of the constitution and by-laws. This was reviewed in detail and since more changes were proposed, another draft would be presented to the Board incorporating these new ideas in the near future. The major change involves the broadening of the association to include industries other than process. The board commended Dr. Zimmerman for his efforts.

13. Meeting was adjourned at 5:30 P. M.. after which all participants were guests of the Mid-Atlantic Regional Section at a cocktail reception in the Hotel Manhattan.

January 30, 1959

1. Meeting called to order at 9:15 A. M.

2. J. Caufield gave a report for the Cost Index Committee. Seven answers have already been received in response to seventeen questionnaires sent out on the survey. A preliminary report was available which would be finalized for presentation at the June meeting. The McGraw-Hill Company is interested in this topic and is willing to contribute to the mechanics of publication and dissemination.

3. C. Hirt discussed the work of the Cost Records Committee. He felt that more agreement is required on basic fundamentals, particularly where terminology is involved. The attempt to go into too much detail impedes progress and duplicates work which may vary substantially among different companies.

4. J. Gorey's report on Estimating Methods was read by W. Hand. Two important subjects were near completion and should be ready for presentation at the June meeting.

5. A discussion on methods of presenting Technical Committee Reports followed. Majority opinion favored:

a. Final reports in actual technical sessions.
b. Incomplete reports with unsolved problems through discussions in workshops.

6. R. Fithian presented the report on publications and related subjects. Discussion followed on the "Publication Policy" which had been previously circulated to Board members. The Publication Committee recommended that at this stage of its development the AACE reserve the right to publish any material, but that the Publication Committee also have the power to authorize prior publication by other technical magazines. The proposed policy including the above was approved.

7. After considerable discussion on the format for a membership certificate, the Board requested the Vice-President to review the suggested designs and have a recommendation available for presentation at the June meeting.

8. The official seal was adopted in the form of the original letterhead design plus the addition of the words "Founded 1956."

9. W. Hand was directed to try and work out a plan for directing regional technical committees which could be put into effect at the June meeting. Also, he was to instruct the current chairman of each technical committee as to his respective responsibilities so that progress can be made in the meantime.

10. E. Shanken lead a discussion on publication problems of the *Bulletin*.

a. Papers and letters to Editor should be available a month before publication.
b. A motion was approved to charge $1/copy and $3/year for the *Bulletin* to non-members and other organizations.
c. The question of advertising acceptance was deferred for one year.

11. E. Clark proposed that only one set of dues ($15) be collected by either national or regional treasurer. Regional Section Committee is to make a study of this problem and present a recommendation at the June meeting.

12. J. C. Agarwal of the Admissions Committee reported some disagreement regarding time spent in "cost engineering." which is hard to define. The Board approved a motion to instruct the committee that it was not practical to evaluate time spent in "cost engineering" in judging qualifications for membership.

13. E. Clark discussed Member Relations. Regional sections are being planned in Kansas City, Boston, St. Paul, Baton Rouge, Cincinnati, Los Angeles and Miami.

14. The Board approved in principle that the Mid-Atlantic Regional Section be changed to New York Metropolitan Regional Section subject to a suitable revision in its constitution which is to be presented at the June meeting.

15. J. S. Bleakie discussed the report of the Membership Committee. It was hoped that some analysis of the membership could be made by the type of employment or geographical distribution. Membership increased from 385 to 600 in 1958. Membership drives would be concentrated primarily in the process industries and on management type personnel.

16. E. Shanken discussed procedure for notifying regional secretaries of admission of new members.

17. Elsie Eaves gave a report on Coordination Committee work. The Board approved release of a proposed letter to be sent by AACE Director of External Affairs to other professional societies.

The possibility of setting up a joint meeting with the Estimating Committee of the ASCE was discussed.

18. A. Seekins — Pittsburgh Regional Section president discussed activities of the Pittsburgh section, particularly the problems involving the 1959 convention.

(continued on page thirty-one)

(continued from page twenty-seven)

member participation in all phases of communications. There is work to be done in the three P's — Publications, Publicity and Public Relations. Regional sections have this need as well as the central association.

The first issue of our *Bulletin* was an excellent step forward in communications. Its continuance as a regular publication is essential to the health of the Association. This publication requires a great deal of effort on the part of our executive secretary and he can use all the help he can get. If your talents lean in this direction, why not contact Ed Shanken and volunteer to help.

To put on a successful annual meeting we need good speakers and a wide coverage of membership interest. The regions are in an excellent position to do advance spade work in finding good speakers and assisting the program committee in this way.

Through the *Education Committee* the AACE hopes to promote close co-ordination between the teaching profession and industry. Regions again can contribute towards this objective by interesting local universities in the association. Already there have been inquiries concerning cost engineering courses that might be sponsored by the AACE. Eventually, as the AACE gains in stature, it may be in a position to raise the standard of cost engineering in the universities by offering them recognition as accredited universities.

To carry out this kind of work we need not only members who are willing to work but members who have the blessings of their employers. Without company and institutional backing of these activities there is no future for the AACE. In fact, if such a situation exists anywhere then we have another role to fulfill, that of being salesmen. It is imperative that we secure the interest and blessing of senior personnel of our companies. If the AACE has to be sold, let's get out and sell it.

Not only do we need more member participation but we need more members. Anyone who appreciates the factors I have discussed to-day knows that we have just scratched the surface.

In fact, all these things are part of a vicious circle.

If we want more benefits, we must do more work.

If we want to do more work, we must have participation and more money.

If we want more participation and more money, we must have more members.

If we want more members, we must offer more benefits.

All sections of the chain must advance together as we are only as strong as the weakest link.

I feel like Walter Reuther when asked what he really wanted. His answer was "more".

The only way to get more is to put more in. If we do, our aims and objectives will be accomplished and surely there will be "a new breed of engineer".

Technical Papers

Available free, AS LONG AS THEY LAST, to AACE members, (.50 to nonmembers) by request:

1 — "Accurate Ways to Estimate Pipe Costs" by W. G. Clark

2 — "Computer Speeds Economic Evaluations" by J. F. Adams, W. L. Massey, Jr. and M. Dmytryszyn

3 — "Construction Cost Trends 1913-1957 as measured by the ENGINEERING NEWS - RECORD Cost Indexes"

5 — "Ratio Cost Engineering" by H. C. Bauman

6 — "The Cost of Preparing an Estimate" by K. G. Wolfe

7 — "Which Depreciation Method is Best" by B. J. Gaffney

9 — "Putting the Digital Computer to Work on Cost Data" by C. J. Bauman

11 — "Joint and By-Product Costing" by A. F. Dershowitz

13 — "Preparation of Fire Insurance Valuations" by E. J. Burrows

15 — "Cost Engineering in Education" by A. R. Konecny

16 — "Estimating Capital Costs from Process Flow Sheets" by W. E. Hand

18 — "Estimate Cost of Compression Plants" by I. Bromberg

19 — "Heat Exchanger Cost Data" by H. J. DeLamater ($1.00 to nonmembers)

20 — "Estimate Cost of Fractionation Systems" by I. Bromberg (ENCLOSED) (made possible through the cooperation of the author, the Foster Wheeler Corporation, and the AACE)

Through the cooperation of J. B. Weaver, the Atlas Powder Company has kindly offered to make available to AACE members the following two booklets: METHODOLOGY OF PROFITABILITY, October, 1958, and CHEMICAL COST AND PROFITABILITY ESTIMATION, Compendium of Annual Reviews by J. B. Weaver. Address your request to: James B. Weaver, Manager, Economic Evaluation, Atlas Powder Company, Wilmington 99, Delaware.

The Association is endeavoring to publish in the BULLETIN or make available reprints of papers that are related to the field of Cost Engineering. If you are preparing a paper or have presented previous papers in this field please send a copy to the Executive Secretary so that it can be included in future surveys of data in this area.

WORKSHOPS

Integral Phase of Third Annual Meeting

Workshops will be an important part of the AACE's program for the Third Annual Meeting. Although they have been used successfully by many organizations this is the first time they have been incorporated in an AACE Annual Meeting.

What is a Workshop? . . . a discussion of a given general subject by a small group led by a discussion leader who is well versed in the field being discussed. It is aimed at a practical *interchange* of ideas and techniques, rather than being a presentation of a talk or paper. All participants are expected to draw on their experience and know-how in developing the topic under discussion.

The technical program, under the chairmanship of James J. Caufield, of the Chemetron Corporation, will be one you will not want to miss.

In addition to workshops on Organization of Estimating, Forms and Procedures, Cost Records, Indexes, Estimating Manuals, Field Cost Records, Estimating Practices and Cost Engineering in Education there will be papers presented on Operating Costs, Cost Control, Capital Costs, Profitability, Terminology and Materials Take Off and Control. One of the highlights of the technical program will be a panel on "New Tools of the Profession". Panel participants will include a Computer Expert, a Statistical Expert, an Enlightened Accountant and a Model Expert.

Dr. James H. Black, of the United States Steel Corporation, is looking after the necessary local arrangements in his capacity as General Chairman of Arrangements. He has organized committees composed of members of the Pittsburgh Section who are hosts for the meeting. Our hosts are planning a suitable supplement to the fine technical program. Plans are being made for tours to an Atomic Power Plant, a Steel Mill, Mellon Institute, a research lab and a pickle factory as well as some evening entertainment in the form of Civic Light Opera, a boat ride and a Playhouse.

A special program is being planned for the Ladies that will include a fashion show and trips to points of interest. Plan to combine your vacation with the Annual Meeting and bring your family.

PLEASE RETURN THE PRELIMINARY SURVEY POST CARD, THAT YOU HAVE RECENTLY RECEIVED, SO THAT WE CAN PROJECT OUR PLANNING FOR THE SPECIAL EVENTS.

SUMMARY OF MINUTES

(Continued from page twenty-nine)

19. The Committee on Awards was directed to consider "Life Memberships" (with remission of dues), thereafter such awards to be considered from time to time for individuals who have made outstanding contributions to the progress and welfare of the association.

January 31, 1959

1. Meeting was called to order at 9:10 A. M.

2. C. Chilton read the report of the Publicity Committee prepared by T. Arnold who was absent due to illness. Discussion on the report involved the suggestion that communications and publicity could be improved by sending copies of correspondence with regional section members to the president of such section.

3. Reference was made to National Constructor's Association as an organization with which AACE might have some common interests. It was felt that such interests would involve mainly availability, productivity and rates of construction labor in different areas of the United States.

4. A lengthy discussion followed on the possible reorganization of the technical committees. A great deal of thinking on this subject was clarified but no final agreement was reached. J. Hackney presented a tabulation which should be studied by W. Hand as mentioned above.

5. Meeting was adjourned at 1.15 P. M.

Respectfully submitted,

E. F. Brummerstedt,
Secretary.

Personnel Service

With the dual objective of serving our members and increasing the value of the *AACE Bulletin*, the Board of Directors has approved the establishment of a Personnel Section in the *Bulletin*.

Members will be permitted insertions in the "Men Available" section without charge. There will be a limit of two no-charge insertions per year.

Insertions in the "Positions Available" section will be charged at $10.00, with somewhat higher charges for ads requiring an unusual amount of space.

For further information write to Executive Secretary, Ed Shanken.

MEN AVAILABLE

Chemical Engineer receiving M.B.A. with majors in finance and managerial economics. Desire position in profitability estimation field. Experience in economic evaluation work. Available early June. Warren E. Staudt, 208 Delaware Avenue, Ithaca, New York.

COST ENGINEERING EDUCATION

ITS RESPONSIBILITIES TO THE PROFESSION AND VICE-VERSA

Presented before the November 6, 1958 meeting of the Chicago-Midwest Section of the AACE

By L. R. Shaffer, *University of Illinois*

As an introduction to this talk I would like to state that the following thoughts are mine. I have discussed them with neither my colleagues nor administrators; it could well be that they would disagree with a part or all of them.

The responsibility of the engineering profession might be defined as that of rendering services which will provide for the solicitor of such services a project which is functionally satisfactory, structurally and operationally safe and economically feasible. In its broadest sense education has the responsibility of preparing students of being capable of accepting such a responsibility. Education, then, must be directed to the individual; it must develop and broaden in him personal characteristics which will allow him to become successful in the profession. I believe these characteristics to be the following:

1. Ability on how to think
2. Understanding of the basic fundamentals.
3. Confidence in his ability.
4. Desire to do hard work.
5. Ability to get along with others.

Any student who can be characterized by these qualities can — after learning something of the art of engineering — competently discharge the responsibility of the profession.

Within the frame of reference established by these characteristics lie more specific responsibilities. Of these I wish to discuss only the second, i.e. basic fundamentals. Educators must inform the profession of the subject matter included therein, the profession must acquaint itself with this subject matter and pass judgement on its content. The profession must specify whether the student who has mastered such subject matter is sufficiently "educated" to assume a responsible position in the profession. For in reality the profession sets the pace of the advancement in the science of engineering; it is the responsibility of education to keep abreast with this advancement.

The profession has discharged its responsibility in this regard. In conjunction with members of the American Society of Engineering Education it helped publish a report in 1955 entitled "Report on Evaluation of Engineering Education (1952-1955)." This report is concerned with the "Objectives of engineering education and their implementation(s)." On the whole it is a general discussion of the factors employed in education, i. e. faculty, physical plant, etc., but in the area of curricula its content is specific. It recommends percentages of semester hours that should be devoted to the areas of study defined by the writers of the report. The influence of these percentages in particular and the report as a whole on the educational fraternity has been far-reaching, since, in a large part, it is used as the criteria by the Engineers' Council for Professional Development in criticising curricula currently being offered in our engineering colleges. (The ECPD is the recognized accreditation agency of engineering schools.)

A CASE FOR COST ENGINEERING

It is indeed unfortunate that the cause of Cost Engineering Education must be advanced without the support of this report. Nowhere does the report recommend course work that can be assigned in an academic division which could be entitled Cost Engineering. I do not feel that by this omission the writers do not subscribe to the concept of the economic feasibility responsibility of the engineering profession, but rather I feel that course work existing today is not of the philosophy of education which they recommend. Their philosophy is that engineering art should not be taught in colleges since the engineering art in colleges will normally reflect practice that is already obsolete in part, as the teachers knowledge of practice becomes rapidly outdated. Rather ". . . . studies (which) encompass the solid, unshifting foundation of engineering science (are those) upon which the engineering curriculum can be built with assurance and conviction." Thus, however we choose to educate students in Cost Engineering, it must be done within the framework of the engineering sciences involved therein, for the philosophy of this report permeates the educational field.

Since we do not enjoy the direct support of this document, I believe that our best chance of success for the inclusion of Cost Engineering in the curricula can be realized by creating a branch of engineering called Cost Engineering. This branch is not one as major as those of Electrical Engineering, Civil Engineering, Chemical Engineering, etc. but rather a minor one as Traffic Engineering or Highway Engineering within the broader field of Civil Engineering. Each major division of engineering could include its own branch of Cost Engineering. In this way we could teach the *science* of Cost Engineering in terms of the applications most appropriate to the various fields.

The science on which Cost Engineering need be based must be universally accepted. The development of this science is at the moment most critically needed. In this regard we in education need the complete and generous support of the profession. It is the greatest responsibility of the profession to help us seek out this science.

In order to obtain your help I would like to outline my concepts of our field of Cost Engineering and the divisions to be imposed upon the field for educational purposes. I have divided this field as follows:

1. Basic Sciences*
   a. Mathematics of Probability with Statistical Inference.
   b. Mathematics of Finance.
   c. Higher Algebra.
   d. Electronic Computer Programming with Emphasis on Data Processing for Statistical Studies.

2. Engineering Sciences.
   a. Short-range Cost Estimating
   b. Long-range Cost Estimating
   c. Engineering Economics
   d. Economic Feasibility
   e. Cost Analyses
   f. Cost Control
   g. Operations Research

3. Management
   a. Construction Economics
   b. Aggregate Economics
   c. Economic Statistics
   d. Labor Economics

4. Humanistic and Social Studies
   a. Legal Constraints on Cost Engineering
   b. Theory of Accounting
   c. Cost Accounting

A more detailed report of the proposed subject matter to be covered in an Education Program follows (Appendix I). This report is that prepared by the *AACE Education Committee*. It is not as extensive as the outline presented above for it is concerned primarily with only Part 2. i.e. Engineering Sciences. Furthermore the development of any science must be predicated on the mathematics listed in Part I. In my coursework I have done some of this. The materials which I use in the earlier phases of my coursework are included to indicate the manner in which mathematics can be applied (Appendix II). For specific reference to such applications of science let us consider Part 2a and 2b. In general 2a is that which a contractor must do and 2b is that which anyone who is not a contractor must do. Conceptually these two alternatives are completely different; to a contractor a bid is an operating cost, i.e. direct and indirect costs, plus general overhead cost and plus profit — the sum of all of these tempered by a judgement of competition; to a non-contractor the bid is a *cost*. The information used by a contractor in formulating a bid is unique to his organization and each construction organization is unique in itself. Thus his approach to a bid is a type removed from that used by a non-contractor for the non-contractor must *predict* bids that will be submitted by several contractors.

The non-contractor then must use methods of analysis and approach which are based on information supplied by contractors. The manner in which this information is supplied is under the control of the non-

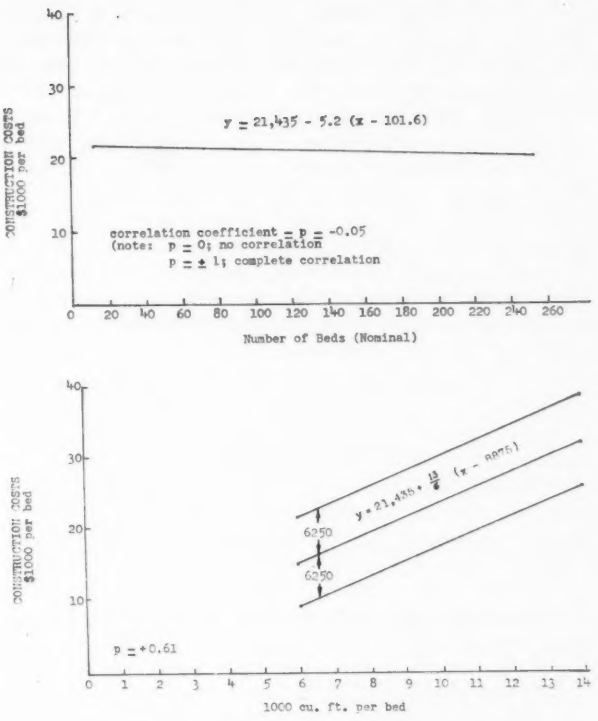

y = 21,435 - 5.2 (x - 101.6)
correlation coefficient = p = -0.05
(note: p = 0; no correlation
p = ± 1; complete correlation
Number of Beds (Nominal)
6250
6250
p = +0.61
1000 cu. ft. per bed

Figure 1. — Cost of Hospital Construction.

contractor for he can determine the manner in which bids are presented. The methods of submitting information will not be pursued in this talk but it must be realized that any method of analysis is completely dependent upon such form. The method of approach, however, will be pursued. An example of this method may be the best introduction.

EXAMPLE OF USE OF COST DATA

I obtained data of construction and total of unit costs of 55 general hospitals of steel and/or concrete framing constructed throughout the United States during the period from October 1948 through December 1954. The reported costs were adjusted by the ENR Building Cost Index and the Dow Service Real Estate Valuation Calculator (1946) to the unit cost in New York City on August 7, 1958. The construction cost includes plumbing, heating, ventilating, air conditioning, elevators, electricity, kitchen equipment, laundry equipment, cabinets, sterilizing equipment and general construction costs. Total costs include construction cost plus contingencies, medical equipment, site survey, supervision and professional fees.

Some of the results of this investigation are shown on Figure 1. In summary these are:

1. The construction cost per bed is, for all practical purposes, constant irregardless of the size as measured by the nominal bed count.

2. 95% of the time the construction cost will be from 83.3-87.0% of the total cost.

* **Note:** The titles of each division are those used in the "Evaluation" report.

3. The average construction cost per bed is $21,435 and in 68% of the cases this average will range from $15,185 to $27,685. However, this average applies specifically to a hospital wherein 8875 cubic feet is distributed per bed. The relationship between cost per bed and cubic feet per bed is given by the equation:

$$\text{Cost per bed} = \$21{,}435 + \frac{13}{6}\ \frac{(\text{ft}^3 - 8875)}{\text{bed}}$$

Thus the total cost of a proposed 100 bed general hospital to be built in Chicago with a contemplated completion date of 1962 would probably be in the range:

$$\text{Low} — 15{,}100\ \$/\text{bed} \times \frac{1}{.87} = 17{,}356 \times 0.91^* = 15{,}794$$

MOST PROBABLE

$$21{,}435\ \$/\text{bed} \times \frac{1}{.851} = 25{,}188 \times 0.91^* = 22{,}921$$

$$\text{High} — 27{,}700\ \$/\text{bed} \times \frac{1}{.833} = 33{,}253 \times 0.91^* = 30{,}261$$

These figures will have to be multiplied by a trend factor.

The method is thus the following:

1. Specify the units in which the bid is to be submitted.

2. Subject unit prices to statistical review.

3. Convert unit prices to metropolitan area and in time by indexing.

4. Reconvert to specific job.

More specific information on a part of this method as applied to the chemical engineering industry can be seen in Carl Bauman's articles in *Chemical Engineering Progress*, January, 1955, and *Industrial and Engineering Chemistry*, April, 1958, and June, 1958.

FURTHER EXAMPLES

Other applications of the science of Cost Engineering can be easily seen in section 2g, i.e. Operations Research. In all of our occupations we deal with the planning of operations — both short-range and long-range planning. In our plannings we hope to achieve some economic advantage, i.e. a least cost, a maximum profit, etc. To achieve such an economic advantage the methods of science must be applied. This application of science has been dubbed Operations Research. Applications on record include the following:

1. INVENTORY PROCESSES

In this area it has come to mean a process involving one or both of the following decisions: (a) How many (much) to order (i.e. produce or purchase) and (b) when to order. These decisions involve balancing inventory carrying costs against one or more of the following: order or run setup costs, shortage or delay costs, costs associated with changing the level of production or purchasing. Some of the tools applicable to these problems are economic — order — quantity equations and linear, dynamic, and quadratic programming.

2. ALLOCATION PROCESSES

These processes arise when (a) there are a number of activities to be performed and there are alternative ways of doing them and (b) resources or facilities are not available for performing each activity in the most effective way. The problem is to combine activities and resources in such a way as to maximize overall effectiveness. If only one is specified the problem is to determine what mixture of the other will yield maximum effectiveness. The tools which have become most closely associated with allocation problems are linear and other types of programming.

3. WAITING-TIME PROCESSES

These processes involve the arrival of units which require service at one or more service units. Except in very rare cases, waiting is required of either of the units requiring service and/or the service units. Costs are associated with both types of waiting time. The problem is to control arrivals or to determine the amount or organization of service facilities which minimizes the sum of these two types of costs.

Queing theory is applicable to problems involving determination of number of service facilities required and/or the timing, i.e. scheduling of arrivals. Sequencing theory is applicable to problems which involve determining the order in which units available for receiving service should be serviced. Finally, line balancing theory is applicable to the problems which involve the grouping of work elements of service activity into a sequence of servicing stations.

4. REPLACEMENT PROCESSES

Replacement processes fall into two classes depending on the life-pattern of the equipment involved; whether the equipment deteriorates or becomes obsolete (i. e. less efficient) with use or new developments (i.e. machine tools) or does not deteriorate but is subject to failure or death (e.g. light bulbs).

For deteriorating items the problem consists of timing the replacement so as to minimize the sum of the cost of new equipment, the cost of maintaining efficiency of the old and/or cost of loss of efficiency. For items that fail the problem is one of determining which items to replace (e. g. all but those installed in the last week) and how frequently to replace them in such a way as to minimize the sum of cost of equipment involved, the cost of replacing the units and cost associated with failure of the unit.

Maintenance problems can be considered a special class of replacement problems since mainte-

* Adjustment factor by Dow Service Real Estate Evaluator
Hence excluding the trend factor this cost shall be in the range of $1,600,000 to $3,100,000 but most probably $2,300,000. (These are ballpark figures only.)

nance usually involves the replacement of a component of a facility or resource rather than the whole. Consequently, the same type of approach is applicable to both maintenance and replacement problems.

5. COMPETITIVE PROCESSES

A competitive process is one in which the efficiency of a decision by one party is capable of being decreased by the decision of another party. The most discussed competitive situation in Operations Research circles is a "game." A game is specified by a number of players, rules for play such that all possible permissible actions can be specified, a set of end states (e.g. win, lose and draw), and the payoffs associated with these end states. The basic set of techniques applicable to this class of problems is known as the theory of games.

Another type of competitive situation is one in which bidding takes place. It differs from a game in the following ways: (a) the number of competitors is not usually known; (b) the possible plays are generally unlimited in number; (c) the payoffs are not known with certainty but can be estimated; and (d) the outcome of the play (win or lose) can usually only be estimated. The beginning of the theory of bidding has just been started but already some tools are available.

6. COMBINED PROCESSES

Real systems seldom involve only one of the above-mentioned processes but usually a combination of them . . . such solutions are obtained by sequencing these processes . . . Moreover these five processes do not cover all Operations Research problem situations.

The reader should not be too influenced by the name of the abstract model. Inventory models are applicable to problems of cash, working capital, and personnel. Queing models may be applicable to the solution of certain inventory problems. Imagination is as much of a key to scientific success as any other mental ability." [Reference No. 2; Pgs. 15-18]

Other examples of the applications of Enginering Sciences could be given but the purpose of these examples is simply to indicate the character of this thing called science. I hope the purpose has been fulfilled. On the basis of the character of such science you may be able to decide how critical to the future of Cost Engineering such definition and application of fundamental principles are. If you believe, as I do, that they are exceedingly critical, you can render great services to the field.

RESPONSIBILITIES OF THE PROFESSION

In discharging our responsibilities, we, in education, attempt to help you in practice, perform your duties. In the same way you can discharge your responsibilities to the educators by helping us perform our duties. According to the "Evaluation" report "(A teacher) should perform creative work whether it be in teaching, writing, research, or professional activities." Of these activities the most critical at the moment is that of "research." With research we could meet all of the other requirements in this definition. To determine what the content of such research should be demands the close inspection of both the Cost Engineering and educational fraternities. Thus no examples of what this research could encompass is included in this talk. However, I would suggest, for your consideration the formation of a committee which would be entitled "AACE Committee of Education and Research — Midwest Section." In such a committee this content could be developed.

In order to perform this research graduate students will be required. To justify to himself the advantage of seeking an advanced degree, such as a Master of Science degree, the student must be convinced of his greater potential of achieving success in the profession because of it. Will students trained in the areas described on page (33) have this potential in your organizations? Can you efficiently use such personnel? Are you willing to offer approximately $6.500/year as a starting salary to these students? We need students; your utilization of them creates our demand.

Earlier I mentioned imagination as a tool of scientific advancement. Imagination can become abstract — too abstract — if we, dedicated to scientific advancement, must found our thoughts on arbitrary bases which we may establish. To found our thoughts on existing bases we need information on what you are doing in the practice of our profession. Thus cost books (which can be out of date), organization charts, estimating forms, profitability books, cost engineering reports, etc. can be of great aid to us. I don't suggest the violation of company or client security but any information that does not violate this security would be of great value to us. For on the bases defined by such items we could develop concrete thoughts.

Thus the future of Cost Engineering holds a great deal of responsibility for both you and me. In this talk I have attempted to correlate the efforts required by you in the profession and us in education to successfully meet the challenges which arise in our attempts in accepting these responsibilities.

As I mentioned in the beginning these thoughts are mine and my colleagues may not agree with them. In fact you may not agree with them. If you do not I hope you will speak, for in order to be better able to render service to the profession I need to know what is wrong with my present frame-of-mind. So, please BE CRITICAL!

APPENDICES

APPENDIX I

A. Proposed subjects to be covered in Education Program
   1. Basic mathematical concepts
      a. Mathematics of finance

2. Depreciation and obsolesence

3. Preliminary cost estimation
   a. Capital investment
      (1) General techniques
         (a) Factor rules
         (b) Order of magnitude rules
         (c) Rules of thumb
      (2) Cost indexes
      (3) Interpretation and collection of data
   b. Operation (Production)
      (1) General techniques
         (a) Factor rules
         (b) Order of magnitude rules
         (c) Rules of thumb
      (2) Cost indexes
      (3) Interpretation and collection of data

4. Detailed (firm) cost estimation
   a. Capital investment
      (1) Equipment
      (2) Labor
      (3) Material
      (4) Overhead
      (5) Financing
      (6) General
   b. Operation (Production)
      (1) Equipment
      (2) Labor
      (3) Material
      (4) Overhead
      (5) Financing
      (6) General

5. Profitability evaluation
   a. Returns
      (1) Methods for determining
      (2) Preliminary estimation
      (3) Analysis after plant or unit is in operation
   b. Optimum conditions
   c. Alternatives and replacements

6. General
   a. Taxes
   b. Cost accounting
   c. Legal aspects
   d. Reporting results
      (1) Corporation annual reports
   e. Social values or nonmathematical limitations

APPENDIX II

Outline of Course Entitled "Construction Costs and Estimates"

A. Definitions of costs

B. Development of a detailed estimate (see below)

C. Definition and criteria of first cost models

D. Statistical formulations for application to first cost models
   1. Normal distribution
      a. Data characteristics
      b. Correlation
      c. Sampling criteria
      d. Standard error of estimates
   2. Index numbers
   3. Curve fitting
      a. Linear
      b. Parabolic — 2nd degree

E. Conceptual formulation of estimating (Figure 2)

F. Application of statistical formulations to estimating

G. Estimating as practiced today

H. Sources of information in estimating available for public use

I. Detailed estimating

   (See "Development of a Detailed Estimate")

J. Typical records for use in estimating

K. Fundamentals of cost control

L. Fundamentals of cost analyses

M. Problems
   1. First cost model study (see below)
   2. Application of statistical formulations (Figures 2 and 3)
   3. Source search for information on present-day concepts of estimating (including indices):
      a. Buildings
      b. Highways
      c. Bridges
      d. Sewer lines
      e. Sanitary treatment plants
   4. Detailed estimate of a highway bridge

FIRST COST MODEL PROBLEMS

1. A bridge is to be constructed of concrete arches. The cost engineer suggests as a first cost model of construction costs the following equations —

   Cost of land abutments in dollars = 75 x span + 800.

Cost of piers in dollars = 120 x span ÷ 1000.
Cost of superstructure in dollars = $L^{1.8}$ where L in ft.

The bridge length is to be ½ mile. What number of spans give lowest cost? Draw a first cost curve. What is the first cost of the bridge?

2. Select two pieces of equipment or machinery. Obtain from one of following sources the costs of various sizes of equipment:
   a. Sears & Roebuck catalogue.
   b. Montgomery Ward catalogue.
   c. Machinery supplier catalogue.

   Draw first-cost curves of specific pieces of equipment selected.

THE DEVELOPMENT OF A DETAILED ESTIMATE

SALES DEPARTMENT

1. Specifications
2. Contracts
3. Drawings
4. Questionnaire

PURCHASING DEPARTMENT

1. *Reviews, specifications and drawings*, to determine what work shall be subcontracted.
2. *Sends post cards* to qualified subcontractors. For each item to be subcontracted, the number of cards sent are
   a. Minimum — 3
   b. Maximum — 10

COST ENGINEER

1. *Studies, contracts, and specs.* to see that no conditions are included that construction company would not want to assume.
2. *Studies, plans, and specs.* to familiarize himself with type of work required and conditions under which it will be handled.
3. *Quantity take-off*
   a. Completed according to aspects of job company defines if no bid items exist.
   b. If bid items exist, completed as defined by them.
4. From such studies *considers several methods by which job can be done.*
5. *Visits and studies site*
   a. Obtains information on the conditions of site which will cause problems in construction.
      (1.) Personal observation.
      (2.) Topographical maps of area.
      (3.) Discussion with residents familiar with area.
   b. Selects most feasible and cheapest method.

Figure 2. — Conceptual Formulation of Estimating.

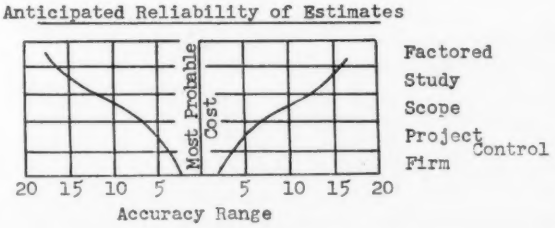
		Classification of Estimate				
		A	B	C	D	E
1.	Location	x	x	x	x	
	General Description	x	x	x		
	Soil Bearing	x	x	x		
	Location and Dimensions RR	x	x	x		
	Roads, Impounds, Fences					
	Well Developed Plot Plan and Topographical Map	x	x			
	Well Developed Site Facilities	x				
2.	Preliminary Sizing and Mtl. Specs.			x	x	
	Engineered Specs.	x	x			
	General Arrangement					
	a) Preliminary			x		
	b) Engineered	x	x			
3.	Approx. Size and Type of Construction			x	x	
	Foundation Sketches	x	x	x		
	Architectural and Construction	x	x	x		
	Preliminary Struc. Design			x		
	Gen. Arrangements and Elevations		x			
	Detailed Drawings	x				
4.	Approx. Type and General Selection			x	x	
	General Specifications					
	a) Preliminary			x		
	b) Engineered (Exact Quantity)	x	x			
5.	General				x	
	a) Preliminary			x		
	b) Engineered	x	x			
	Detailed Drawings	x				
6.	General				x	
	a) Preliminary			x		
	b) Engineered	x	x			
	Detailed Drawings	x				
7.	General				x	
	a) Preliminary			x		
	b) Engineered	x	x			
	Detailed Drawings	x				
8.	General				x	
	a) Preliminary			x		
	b) Engineered	x	x			
	Detailed Drawings	x				
9.	Architectural, Engineering and Drafting	x	x			
	Field Supervision	x	x			
10.	Capacity, Location, Date and Nature of Construction					x

Key

1. Site
2. Equipment List
3. Structure
4. Material List- Structure
5. Electrical
6. Heating and Ventilating
7. Plumbing
8. Insulation
9. Professional Fees
10. Project Scope

A. Firm
B. Project Control
C. Scope
D. Study
E. Factored

Figure 3.



6. *Writes engineering report* and *submits questionnaire* on findings to date.

7. *Develops Progress Schedule*
   a. Purpose
      (1.) To avoid wasted time during construction irregardless of whether job has completion date.
      (2.) For purchasing dept. to have approximate date on receiving of materials.
      (3.) For subcontractors to have approximate date for reporting on job.
      (4.) For determining amount of time required for completing work.
      (5.) For determining amount and types of equipment required for performing job.
      (6.) To obtain committments on availability of equipment for job.
      (7.) For determining time of year work will occur to determine indirect costs as weather protection, heat plant, light plant, labor availability, labor productivity, labor multiple pay scales.
   b. Execution
      (1.) Obviously it is a fairly detailed plan of the work.
         (a) Examples
            [1] More economical to mix concrete at site or elsewhere and deliver it to site?
            [2] Spot hoists, cranes, derricks, storage piles, etc.

8. *Examines Company Records*
   a. Characteristics of records
      (1.) Records of actual cost experience broken into detailed classifications of phases of work.
      (2.) Show for each phase of work.
         (a) Actual quantities used.
         (b) Unit cost of labor.
         (c) Unit cost of material.
         (d) Total expenditure.

9. *Receives quotations from material subcontractors*
   a. Examines qualifications of low bid subcontractors.
   b. On basis of personal knowledge and opinion establishes price trend lines for materials and wage rates.

10. Transfers cost to *Direct Cost Sheets*
   a. Characteristics of D. C. Sheets.
      (1.) Brief description of item.
      (2.) Quantity of item.
      (3.) Unit cost of labor.
      (4.) Unit cost of material.
      (5.) Total cost of labor.
      (6.) Total cost of material.
      (7.) Total cost.

(At this point, the Project Manager gives an independent opinion on costs of labor, materials, time schedule, job strategy and labor force.)

11. Calculates *General Overhead Costs*
   a. Qualifications
      (1.) Not a % flat fee.
      (2.) Varies with at least
         (a) Nature and size of job.
         (b) Time of year.
         (c) Location of job.
         (d) Work performed by own forces.
         (e) Statutes of government controlling geographical location.
   b. Examples
      (1.) Field and office staff and quarters.
      (2.) Rental of construction equipment.
      (3.) Taxes.
      (4.) Insurances.
      (5.) Temporary heat, light and power.
      (6.) Moving equipment on and off of job.
      (7.) Clean up.
      (8.) Temporary access roads.

12. Calculates *Budget Estimate*
   a. Purpose.
      (1.) Separate check on final cost.
   b. Execution
      (1.) From records: Actual cost/basic unit.
         (a) Basic unit=ft^2, ft^3, etc.
         (b) Actual cost/basic unit selected by considering in part.
            [1.] Accessibility of area of construction.
            [2.] Foundation construction.
            [3.] Shoring of nearby structures during construction.
            [4.] Ratio periphery walls/cross-sectional area.
            [5.] Ratio building hgt./cross-sectional area.
            [6.] Construction activity at time contract let.
            [7.] Construction in winter before enclosure.
            [8.] Conventionality of design.

13. *Cost Mark-up*
   a. Includes
      (1.) Proportionate share executive salaries.
      (2.) Estimating department expenses.
      (3.) Main office overhead.
      (4.) Maintenance and storage yard expense.
      (5.) Bond premiums.

14. *Attends Executive Council Meeting*
   a. Purpose
      (1.) Attain final costs.
      (2.) Determine profit percentage.

(3.) Attain bid price.
(4.) Obtain executive approval of bid price for company investment.

b. Attendance
(1.) Chief cost engineer.
(2.) Head of Purchasing.
(3.) Vice-President in charge of purchasing.
(4.) Project manager.
(5.) Contract manager.
(6.) Vice-President in charge of construction.

c. Time
(1.) Day before bid is submitted.

15. *Submits bid price*
a. Form of submittal dependent upon instructions in specifications and/or contract.
(1.) Lump sum.
(2.) Cost + fixed fee.
(3.) Cost + %
(4.) Cost + guaranteed margin.
(5.) Bid items.
(a) All costs delivered to each item in accordance with cost of item rather than unbalancing bid.
(b) But items of work which come first should carry costs that come early whether or not they are applicable to that item.
[1] Examples.
[a] Moving on job, temporary housing, etc.

CE 237 — PROJECT 1

The data which appears in Table 1 are the unit costs for schools (primarily elementary schools) with steel skeleton type framing systems. This data was supplied by the AIA Department of Education and Research which conducts national surveys of building cost data. These results are published in the "Bulletin of the American Institute of Architects" and are entitled "Summary of Building Cost Data."

It is not the intent of the AIA that "this information should be relied upon exclusively for estimating purposes. Each office will have its own detailed cost records. Purpose of this summary is to provide a general check on unit costs between various parts of the country and for various building types." Because of the limitation of publication space no sketches of the plans reported by reporters are included. "Number of corners indicate relative complexity of plans. Cost data do not include costs of lands, surveys, soil investigations, or fees for architects or professional engineers."

By implication the unit cost is tied to the complexity of the job — a logical implication. But is the number of corners a satisfactory measure of its complexity? The primary purpose of this study is to answer this question.

To answer this question the following sequence of operations is suggested:

1. Correct each unit cost for time by applying the ENR Building Cost Index.
2. Correct the time-corrected unit costs for location by the "Dow Jones Real Estate Evaluation Calculator."
   Modify time-corrected unit costs to New York City costs.
3. Determine linear regression equation.
4. Calculate correlation coefficient.
5. Calculate coefficient of validity.

TABLE 1
UNIT COSTS FOR SCHOOLS WITH STEEL SKELETON TYPE FRAMING SYSTEMS
UNIT COST vs. NO. CORNERS

No.	Location	Date	No. Corners	$/ft³	$/ft²
1.	Cooperstown, N. Y.	Jan. 54	30	1.41	18.60
2.	Corning, N. Y.	(54)	22	1.12	16.58
3.	Long Island, N. Y.	Feb. 54	18	1.41	18.85
4.	Corning, N. Y.	(54)	16	1.14	16.83
5.	Syracuse, N. Y.	Feb. 54	18	0.99	14.90
6.	Glenn Rock, N. J.	Oct. 53	24	1.15	19.00
7.	Upland, Pa.	Mar. 53	14	1.07	16.93
8.	Chattanooga, Tenn.	Apr. 54	42	0.62	8.92
9.	Jeff. County, Ky.	Jan. 54	19	0.58	8.21
10.	Birmingham, Mich.	Apr. 54	21	2.06	21.80
11.	Oak Park, Mich.	Nov. 53	24	1.06	13.65
12.	Kanab, Utah	Mar. 54	14	1.02	12.90
13.	Fairchild, Conn.	Mar. 53	22	1.09	13.72
14.	New Milford, Illinois	June 53	14	0.44	10.00
15.	Anoka, Minn.	June 53	12	1.05	14.30
16.	Faribult, Minn.	(54)	21	1.11	15.20
17.	Farmington, Minn.	Apr. 54	22	0.97	13.25
18.	Buffalo, N. Y.	Nov. 52	6	1.16	23.10
19.	Clarence, N. Y.	Mar. 53	16	1.17	19.60
20.	Latham, N. Y.	Feb. 53	16	1.05	15.72
21.	Ont. Center, N. Y.	July 51	16	1.02	20.17
22.	Thalia, Va.	July 53	50(8 units)	1.11	16.96
23.	Va. Beach, Va.	Aug. 51	33	0.77	14.00
24.	Cohutta, Ga.	Jan. 53	10	0.55	6.59
25.	Gladewater, Tex.	Oct. 53	14	0.73	10.36
26.	Champaign, Illinois	July 53	28	0.97	14.48
27.	Minneapolis, Minn.	May 51	12	1.29	18.20
28.	New Lennox, Ill.	Mar. 53	32	0.87	15.63
29.	Park Forest, Ill.	July 52	17	0.94	12.71
30.	Park Forest, Ill.	Nov. 52	13	0.96	12.78
31.	Sturg Bay, Wis.	Oct. 53	8	0.89	12.32
32.	Antioch, Calif.	Sept. 53	14	1.21	14.88
33.	Cross River, N. Y.	May 55	48	1.19	20.66
34.	Niagara Falls, N. Y.	(54)	26	1.80	17.88
35.	Northport, Long Island	Oct. 54	26	1.50	25.74
36.	Syracuse, N. Y.	Apr. 55	26	1.10	15.40
37.	Beardsley, Minn.	June 54	20	0.83	11.47

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News from the Regions

ORGANIZATION OF NEW SECTIONS

In order to provide an opportunity for group activities at the local level, the AMERICAN ASSOCIATION OF COST ENGINEERS encourages the formation and establishment of regional sections.

The advantages of closer personal relationships, opportunities for discussion of mutual problems, and the frequent dissemination of data vital to the profession are a few of the reasons for joining or forming a section.

If you reside in an area not covered by an existing Section and would like to benefit from and assist in its organization contact: B. V. Nemeth, *Chairman, Regional Sections Committee, AACE*, 840 Madison Avenue, Painesville, Ohio.

Members residing in the following areas can write to the people listed below. These men are "spark plugging" sections in their regions.

SOUTH CHARLESTON, WEST VIRGINIA
W. F. Gott, Union Carbide Chemicals Company, P.O. Box 836, South Charleston, West Virginia.

QUEBEC, CANADA
James Bachman, 175 Hemlock Drive, Beaconsfield, Quebec, Canada.

ESSEX, ENGLAND
John H. Herbert, 22 Fairway, Leigh-On-Sea, Essex, England.

BOSTON, MASSACHUSETTS
H. J. DeLamater, Anderson-Nichols & Company, 150 Causeway Street, Boston 14, Massachusetts.

ST. PAUL, MINNESOTA
Dr. Bernard J. Gaffney, Wood Conversion Company, First National Bank Building, St. Paul 1, Minnesota.

KANSAS CITY, MISSOURI
Lloyd E. Weast, Jr., 5620 East 48th Street, North, Kansas City 16, Missouri.

Members in the Baton Rouge, Cincinnati, Detroit, Los Angeles, Miami, Niagara Falls, Oak Ridge, Savannah and St. Louis areas are working on the organization of sections in their regions. If you would like to help develop a section in these areas contact Mr. B. V. Nemeth.

CHICAGO — MIDWEST SECTION

An interesting discussion was held on "Contractors' Problems in Cost Estimating" at the December meeting. The discussion panel which was directed by Messrs. Kenneth Anderson, James MacDonald and Clair Towle of Procon, Inc., was completely recorded on a conference room dictaphone belt. Since no written documents were made, the intent was to test out the use of such equipment, and the results proved to be very good, If any section is interested in borrowing the dictaphone belts containing subjects discussed at the monthly meetings of the Chicago-Midwest Section, they should forward their request to the section secretary. It was suggested that other sections consider this as a possible and economical procedure for keeping other sections informed on the technical cost data and discussions which might otherwise prove difficult and expensive to reproduce for the entire national membership.

Mr. John Kronseder's discussion of "The Estimate from the Standpoint of Management" was well received at the January meeting in the University Club. Printed data pertaining to the talk will shortly be made available to the section's membership.

Future subjects that will be presented at the monthly meetings are: "Estimating Data and Methods, its use with Modern Day Business Machines," by Mr. E. J. Mark, Chief Estimator, General Engineering Dept., Pure Oil Co., on February 5th and on March 5, representatives of the IBM Corporation will present a "Discussion of IBM Computers and their Application."

Membership Chairman, W. Twaddle, contacted 75 leading companies in the Chicago area which has resulted in a number of possible new members attending the monthly meetings.

Plans are underway for a dinner meeting to be held in April as part of the Section's annnual meeting. Elections for the new section officers will be held at that time.

GULF COAST SECTION

A very spirited discussion has been taking place on the proposed Code of Accounts. Art Weber, Committee Chairman of the section's study group on this subject, presented his committee's recommendations, and after a discussion by the membership, the report was sent to the National Committee Chairman.

"Estimation of Present Worth of Industrial Plants for Tax Purposes" by Mr. C. E. Lunsford, Manager, Industrial Division of the Pritchard & Abbott Co., and "Cost of Fabricated Metal Products for the Process Industries" by Mr. L. F. Megow of the Hahn and Clay Co., were subjects presented at recent technical meetings of the section.

A successful membership drive under the leadership of J. S. Bleakie has resulted in a 20% increase in membership. The rate of growth is continuing at a slow but steady pace.

Aaron Cohen, representative to the Houston Engineers Council, reported that the Gulf Coast Section has been asked to participate in the Council's Science Education Liaison program. This program has been developed as a supplement to Science Education in the Junior and Senior High School and will enable engineers to work with science teachers in the schools.

MID-ATLANTIC SECTION

C. A. Miller, National AACE President, spoke on the "Aims and Objectives of the AACE" at the January 28 luncheon meeting. Mr. Miller's inspiring talk is published in the current issue of the *Bulletin*.

Due to the pressure of business, Chairman J. Ballenger tendered his resignation, which was accepted with regret. W. Dodge was elevated to the Chairmanship.

The section was host at a reception held for the National Board of Directors while they were in New York for their semi-annual meeting.

NORTHEAST OHIO SECTION

An enthusiastic reception was accorded the Electronic Computor Workshop held on January 30th at the Cleveland Engineering & Technical Center. On a truly workshop basis, the 70 participants were divided into three sections, each of which received a description of the machine and its capabilities during the first session. Actual problems were demonstrated in the second and third sessions, with some of the participants taking part in the programming. Dr. M. Dmytryszyn highlighted the noon luncheon with an interesting question and answer session.

The section felt that the program was a success, and appreciated the excellent cooperation from the computer companies. There is a real interest in this field among Cost Engineers, and the section would be pleased to cooperate in giving more specific information to any other section that would like to conduct a similar program.

Mr. Thomas P. Loftus discussed the function and services available from the Service Bureau Corporation, a wholly-owned subsidiary of IBM, at the December 4th meeting. He noted that their primary service function is operating a computer center that is available on an hourly or job basis to small companies.

"Estimates by Contractors" was the subject of a talk by Mr. Wesley J. Jarvis, Chief Estimator of the Refining Division of the Arthur G. McKee & Co. at the November 6th dinner meeting at the Cleveland Engineering & Scientific Center. Mr. Jarvis' talk covered the various facets and considerations that must be made by contractors in supplying estimates for their clients. A very brisk question and answer session followed the talk.

Future programs that have been planned include a talk by Dr. R. Landau, Executive Vice-President, Scientific Design Co., Inc., New York, who will discuss "Estimating Costs of Foreign Plant Construction" at the April 2nd meeting and a Round Table Discussion of the AACE Proposed Standard Cost Code will be held at the May 7th meeting. Participating in the Round Table will be Harry Eisengrein, Republic Steel Corp., Chairman; Don Stafford, B. F. Goodrich Chemical Co., and John Potoma, Arthur G. McKee & Co.

PITTSBURGH SECTION

Plan to be in Pittsburgh for the 3rd Annual Meeting of the AACE on June 24, 25 and 26, 1959. The section has been enthusiastically arranging for the Annual Meeting and it should be quite a time. Mr. W. M. Hutchinson has been appointed Carnegie Tech's coordinator for the Meeting and is working very closely with the local committee.

Dr. J. H. Black moderated a panel discussion on the subject "AACE Cost Codes and Terminology." Panelists were Messrs. M. K. Armentrout, J. S. Busch, J. F. Rigatti and C. E. Sunnergren. The results of this lively session were recorded and forwarded to the Standards Director and to the National Terminology and Code Committee Chairman.

The section would like to have all the National AACE members residing within its jurisdictional area attend its meetings and benefit from participation in its many activities.

Mr. J. F. Lovett has been appointed to the National Publicity Committee.

"Chemical Plant Construction Costs" was the subject of an interesting and informative talk by Mr. Sidney Forbes, Chief Planning Engineer, Columbia-Southern Chemical Corporation at the January 14th meeting.

Mr. John W. Hackney, founding member and past President of the AACE will speak on the "AACE National Organization" at the March 20th meeting.

Membership Committee Chairman, W. C. King, has been carrying on a vigorous campaign of promoting membership. President A. W. Seekins reported that the section has had a 72% increase in membership and a 67% increase in activity since last year.

SAN FRANCISCO BAY SECTION

"How to Estimate Piping" was the subject of a talk by Mr. William W. Cockins, General Partner in charge of Estimating, Scott Company, San Francisco. His audience of 72 persons attending the January 28th meeeting was well rewarded by the very informative talk he presented after a fine dinner.

MONTREAL AREA

Sparked by C. Arthur Miller and James Bachman the first meeting of members in the Montreal area was held. Included in the discussion that followed an informal luncheon was general agreement that the scope of the AACE should not be restricted to any particular industry. The main purposes of the meeting was to acquaint members in the area with each other and to make plans for the future development of a section.

Future meetings are planned for intervals of two to three months. The group is striving to increase the membership in the area before taking definite steps to establish a regional section.

What's Happening . . .

John W. Hackney, past president of the AACE, has been promoted to Manager, Construction & Cost Engineering of the Central Engineering Department at the Diamond Alkali Company.

Richard P. Askerman recently returned from a construction project in Peru, South America. He is associated with the Rosendahl Corporation.

James W. Perry has been promoted to Assistant Director of the Design & Construction Department at the Union Carbide Chemicals Company.

Robert V. Parkison has been named Director of the New Project Development Department at the Spencer Chemical Company.

Sidney Katell and T. J. Joyce are the authors of "Determining Process Unit Operating Costs" which appeared in the October, 1958 issue of *Cost Engineering*. Mr. Katell has also published "The Economic Outlook for Pipeline Gas From Coal" in the September, 1958 issue of *Coal Age*, and was the author of the Bureau of Mines Information Circular 7847 entitled "Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, July, 1954 — December, 1956."

Robert H. Fuller has been promoted to Chief Estimator of The Lummus Company.

Donn F. Pennell has been named Assistant Executive in the Director's Office of the Ernest O. Lawrence Radiation Laboratory at the University of California. He was formerly with Kaiser Engineers.

Dr. Bernard J. Gaffney, AACE Vice-President, is now Director of Engineering for the Wood Conversion Company of St. Paul, Minnesota. He was formerly the New York Manager of the Rust Engineering Company.

Walter H. Kluge has been named Vice-President of the Southern Industrial Piping Company.

Walter L. Hardy is now affiliated with the International Minerals & Chemical Corporation in Skokie, Illinois. He was formerly with Foster D. Snell, Inc.

Lloyd B. Andrew, Jr. has been promoted to Director of Economic Research for the Ethyl Corporation.

E. F. Young, Jr., Jones & Laughlin Steel Corporation, a Director of the Pittsburgh Section, spoke to the Mineral Engineering students at Massachusetts Institute of Technology on January 6, 1959. His talks were on the subjects of "Cost Engineering" and "Evaluation of an Ore Prospect."

James W. McKay has been named Chief Mechanical Engineer of the Consolidated Mining & Smelting Company of Canada, Limited.

John D. Fricke has been promoted to Director of Budgets & Costs of the Manufacturing Department of the Gulf Oil Corporation.

James C. Vosburgh was promoted to Cost Co-ordinating Engineer for the Engineering Development Center of The Lummus Company in Newark, New Jersey.

James J. Caufield has been promoted to Administrative Manager and *G. William Boston* has stepped up to the Head of the Controls Section of the Girdler Construction Division of the Chemetron Corporation.

Herbert Herkimer is the author of the recently published "Cost Manual for Piping and Mechanical Construction."

George T. Driskill has been promoted to Chief Estimator of The Dow Chemical Company.

Frank M. Russell is now associated with Aerojet-General Corporation as a Project Estimator. He had been with C. F. Braun and Company.

D. J. Shellenberger has been promoted to Supervisor of Chemical Engineering Services, Research Division, Jones & Laughlin Steel Corporation.

Frank Sanderson is now Senior Accountant at the Thiokol Chemical Corporation.

E. H. Flewellen, Jr. is now Branch Head of Financial Planning for the Texas Instruments Company. He was formerly associated with the Celanese Corporation of America.

Lloyd V. Lindquist is now associated with the Lindquist-McNely Company. He was formerly with Camping Construction Company.

Robert A. Northcutt is now affiliated with A. Teichert and Son. He was formerly associated with Kaiser Engineers.

James K. McCauley, Jr. is presently with the Crucible Steel Company of America. He was previously affiliated with Jones and Laughlin Steel Corporation.

Gilbert A. Smith is presently associated with The Bristol Company. He was formerly affiliated with the Pennsalt Chemicals Corporation.

NEW ENGLAND REGION TO HOLD ORGANIZATION MEETING

All members in the New England Region are invited to attend the organization meeting of the New England Regional Section on April 25th at the Hotel Lennox, Boston, Massachusetts. A dinner meeting and interesting program is planned. Contact H. J. DeLamater, Anderson Nichols and Company, 150 Causeway Street, Boston 14, Massachusetts for further details.

Alfred A. Dohn, one of the Charter Members of the AACE, died on October 8, 1958. He had been associated with the Nitrogen Division of Allied Chemical & Dye Corporation in Hopewell, Virginia.

Fred M. Farmer died in November, 1958. He had been with the Merritt-Chapman & Scott Corporation in Baltimore, Maryland.

Regional Section Directory

If you reside near one of the regional sections contact the secretary so that you can benefit from the worthwhile activities of your region. If a business trip coincides with a meeting of a section outside your region you are welcome to participate in any and all activities.

CHICAGO — MIDWEST

President — Daniel T. Brink, Corn Products Refining Co., 201 N. Wells Street, Chicago 6, Illinois.

Secretary — E. John Mark, Room 2148, 35 East Wacker Drive, Chicago 1, Illinois.

DELAWARE VALLEY

President — Herman A. Chapman, Atlantic Refining Co., 260 South Broad Street, Philadelphia 1, Pennsylvania.

Secretary — John J. Farrell, Catalytic Construction Co., 1528 Walnut Streeet, Philadelphia 2, Pennsylvania.

GULF COAST

Chairman — Walter H. Kluge, Southern Industrial Piping Co., P. O. Box 74, Houston 1, Texas.

Secretary — Thomas C. Ponder, *Petroleum Refiner*, P. O. Box 2608, Houston 1, Texas.

MID — ATLANTIC

Chairman — Wesley J. Dodge, Socony Mobile Oil Co., 150 East 42nd Street, New York 17, New York.

Secretary — E. F. Brummerstedt, Foster Wheeler Corp., 666 Fifth Avenue, New York 19, New York.

NORTHEAST OHIO

President — William J. Hegerty, Colonial Iron Works Co., 17643 St. Clair Avenue, Cleveland 10, Ohio.

Secretary — James C. Cowan, Columbia - Southern Chemical Corp., P. O. Box 31, Barberton, Ohio.

PITTSBURGH

President — Addison W. Seekins, Columbia - Southern Chemical Corp., One Gateway Center, Pittsburgh 22, Pennsylvania.

Secretary — James J. Butler, Jr., Jones & Laughlin Steel Corp., Graham Research Laboratory, 900 Agnew Road, Pittsburgh 30, Pennsylvania.

SAN FRANCISCO

President — William G. Clark, Dow Chemical Co., P. O. Box 351, Pittsburg, California.

Secretary — Gus A. Anderson, Kaiser Engineers, 1924 Broadway, Oakland 12, California.

Supplement to Membership List

The following have been elected to membership since the distribution of the membership list.

A Directory is presently being compiled that will include the name, title, company and mailing address of every active member.

Adkins, Donald G., Gulf Breeze, Florida
Allen, Duncan G., Houston, Texas
Armstrong, R. B., Pasadena, Texas
Arnold, Thomas H., Jr., New York, New York
Babcock, K. E., Painesville, Ohio
Babin, Thomas M., Baytown, Texas
Balotti, Richard R., Wilmington, Delaware
Barthelson, Norman A., Wilmington, Delaware
Batte, Marcus H., Baton Rouge, Louisiana
Bauman, H. Carl, New York, New York
Bayless, Charles H., Cleveland Heights, Ohio
Bierman, Clifford D. H., Pittsburgh, Pennsylvania
Bourbeau, Joseph, Montreal, P. Q., Canada
Boyce, Walter J., Cleveland, Ohio
Caler, Emery E., New York, New York
Carnegie, Douglas R., Staten Island, New York
Castle, Ronald E., Miller Place, New York
Center, C. Eugene, Pittsburgh, Pennsylvania
Cheney, Donald S., Stamford, Connecticut
Chester, John M., Pacific Palisades, California
Christgau, Arthur H., New York, New York
Condon, John A., Miami, Florida
Connell, Joseph T., Pittsburgh, Pennsylvania
Cross, Raymond, Dighton, Massachusetts
Dempsey, James F., Marcus Hook, Pennsylvania
DiGiacinto, Albert, Yonkers, New York
Disman, Solomon, Highland Park, Illinois
Domino, Gasper S., Fair Lawn, New Jersey
Donovan, W. J., Waco, Texas
Duncan, Norman E., Cleveland, Ohio
Eason, Walter E., Jr., Baltimore, Maryland
Eisengrein, Harry F., Cleveland, Ohio
Ettinger, John T., Pompton Lakes, New Jersey
Evans, Daniel G., Wilmington, Delaware
Fair, William H., III, Corpus Christi, Texas
Fila, Edward, Sedro-Woolley, Washington
Flynn, James P., Jr., Port Arthur, Texas
Forrest, H. Dean, Ashtabula, Ohio
Fox, Robert S., Pottstown, Pennsylvania
Frank, John G., Detroit, Michigan
Friedman, Abraham N., New York, New York
Friesen, F. H., Edmonton, Alberta, Canada
Gaeto, Anthony J., Pottstown, Pennsylvania
Ginwala, Kymus, Cambridge, Massachusetts
Goudstikker, Jean M., Guatemala-City, Cen. America
Grover, Albert E., Cleveland Heights, Ohio
Handza, George E., Bayonne, New Jersey
Harada, Yuzo, Tokyo, Japan
Herkimer, Herbert, New York, New York
Hermann, Richard C., Montreal, P. Q., Canada
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